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Air Quality Bureau

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Air Quality Bureau  
New Mexico Environmental Department  
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Santa Fe, New Mexico 87505

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**RE:** Corrective Action Plan for Artesia Refinery Describing Fenceline Benzene Monitoring Root Cause Analyses and Corrective Actions

HollyFrontier Navajo Refining LLC (Navajo) is submitting this letter for the Artesia, New Mexico Refinery pursuant to the requirements of the National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (MACT CC) at 40 CFR 63.658(h). The MACT CC compliance period for collecting fenceline benzene monitoring data began on January 30, 2018. In October 2016, Navajo proactively began collecting fenceline benzene monitoring data as part of a pilot study to evaluate site conditions prior to the beginning of applicable compliance period for MACT CC. A site map providing the layout of the facility and the fenceline monitoring locations is provided as Figure 1 (attached).

40 CFR 63.658(f)(2) provides that the owner or operator shall calculate the annual average difference between highest and lowest benzene concentrations as measured at the fenceline based on the average of the 26 most recent 14-day sampling periods. (EPA refers to the difference between highest and lowest 2-week (14-day) benzene concentrations reported at the facility fenceline as “ $\Delta c$ .”)<sup>1</sup> Navajo collected the 26th 14-day period sample needed to calculate the annual average benzene concentration at the fenceline (*i.e.*, the annual average  $\Delta c$ ) on January 29, 2019, and received the results on February 5, 2019. The results showed benzene concentrations above the annual average action level of 9 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), triggering the root cause analysis and corrective action requirements of 40 CFR 63.658(g). Even prior to this, Navajo implemented a number of activities beginning in 2017 and 2018 to evaluate potential sources at the facility of the benzene detected during the pilot study, and implemented several corrective actions for the identified sources, including during the 2018 compliance period (January 30, 2018 – January 30, 2019). These activities, once implemented, reduced the 14-day benzene concentrations at the fenceline ( $\Delta c$ ) to below the level of 9  $\mu\text{g}/\text{m}^3$  during the latter portion of the 2018 compliance period, with one exception.<sup>2</sup> The following provides a summary of the root cause analyses and corrective actions implemented.

**April 2017 Root Cause Analysis**

Data from March 2017, prior to the applicable compliance period under MACT CC, for fenceline monitoring locations 5 through 10, and 13 through 16, indicated that the 14-day sampling period benzene concentrations were above 9  $\mu\text{g}/\text{m}^3$ . Navajo conducted a FLIR camera survey of storage tanks near these fenceline monitoring locations in April 2017, to assess the potential that any of these tanks might be a source of the monitored benzene. Specifically, the following were surveyed: the #3 Blender and Tanks 57, 401, 450, 111, 417, 418, and 434. The location of Tank 57 correlated to benzene detected at fenceline monitoring locations 13 through 16. The locations of Tanks 401 and 450 correlated to benzene detected at fenceline monitoring locations 5 through 7. The blending pit, and Tanks 111, 417, 418, and 434 were evaluated in the May 2017 root cause analysis

<sup>1</sup> 40 CFR 63.658(f)(1); 83 Fed. Reg. 15458, 15466 (Apr. 10, 2018).

<sup>2</sup> This was in January 2019 and correlated with maintenance work on one tank (Tank 11). Steps are being taken to minimize emissions during future tank maintenance.

below. As a result of this root cause analysis, Navajo worked with TANCO Engineering, Inc. ("TANCO") to install socks on the vacuum breakers and roof legs to reduce emissions from Tanks 57, 401, and 450 in December 2017. See corrective actions implemented in December 2017.

### **May 2017 Root Cause Analysis**

To further evaluate potential sources of benzene emissions, Navajo set out four temporary sample locations (TS1 through TS4) for a 14-day period in the vicinity of the other units surveyed in April 2017. As noted above, these were the #3 Blender and Tanks 111, 417, 418, and 434. Benzene detection levels at TS1-TS4 were as follows: TS1 = 19, TS2 = 6.3, TS3 = 15, TS4 = 17 (in  $\mu\text{g}/\text{m}^3$ ). During the sampling period, however, wind direction was highly variable, making it difficult to validate that these units were contributing sources of the observed benzene detected at these sample locations. Benzene concentrations at fenceline monitoring locations 8 through 10, which may correlate to these units, dropped below  $9 \mu\text{g}/\text{m}^3$  in subsequent 14-day sampling periods, from May 2, 2017 through August 22, 2017, the hottest time of the year. Additionally, benzene concentrations for monitoring locations 8 and 9 continued to be below  $9 \mu\text{g}/\text{m}^3$  throughout most of 2017-2018, with intermittent sampling data above this level. As a result, Navajo did not identify these tanks as primary sources of benzene concentration at the fenceline.

### **September 2017 Root Cause Analysis**

Navajo set out four additional temporary sample locations (TS5 through TS8) for a 14-day period to undertake further evaluation of potential benzene sources, focusing on Tanks 56, 57, 802, and 737. The samples were placed adjacent to these tanks, and the resulting monitoring data was as follows: Tank 56 (TS5 =  $48 \mu\text{g}/\text{m}^3$ ), Tank 57 (TS6 =  $318 \mu\text{g}/\text{m}^3$ ), Tank 802 (TS7 =  $359 \mu\text{g}/\text{m}^3$ ), and Tank 737 (TS8 =  $248 \mu\text{g}/\text{m}^3$ ). The primary wind direction during this sample period was from the south-southeast. Taking into account wind direction, the detected benzene concentrations from these temporary sampling locations indicate that Tank 57 may be the primary source of benzene in this area.

### **December 2017 Corrective Action**

As a follow-up to the April 2017 root cause analysis, described above, and to address hydrocarbons detected from Tanks 57, 401, and 450, between June and November 2017, Navajo engaged TANCO to review the configuration of the tanks to determine the number of socks needed, evaluate design options, complete fabrication of the selected design, and coordinate installation of the socks. In December 2017, TANCO installed socks on the vacuum breakers and roof legs to reduce potential emissions from Tanks 57, 401, and 450. Based on subsequent fenceline benzene sample results, these socks appear to have been effective in reducing benzene concentrations for Tanks 401 and 450, but not as similarly effective for Tank 57.

### **July 2018 Corrective Action**

Subsequent to the December 2017 corrective action, Navajo worked with TANCO to design and install a more effective sock for the vacuum breaker on Tank 57. In July 2018, the newly designed sock was installed on Tank 57. Although data from the subsequent 14-day sample periods showed reduction in benzene concentrations associated with Tank 57, the difference in benzene concentrations at the fenceline ( $\Delta c$ ) remained above  $9 \mu\text{g}/\text{m}^3$ .

### **August 2018 Corrective Action**

In determining potential further options for reducing benzene concentration near Tank 57, Navajo identified that a heat exchanger intended to cool the product entering Tank 57 was not sufficiently cooling the incoming feed. This heat exchanger was repaired in August 2018, which resulted in reduction of the temperature entering Tank 57 from  $100^\circ\text{F}$  to approximately  $80^\circ\text{F}$ . Over the next several 14-day sampling periods, benzene



concentrations detected at monitoring location 14, which may correlate to Tank 57, reduced significantly but were still above  $9 \mu\text{g}/\text{m}^3$ .

### **November 2018 Root Cause Analysis**

Navajo set out three temporary sampling locations (T13A, T14A, and T14B) in the vicinity of Tank 57 to evaluate the area for other potential benzene sources after the heat exchanger repair significantly reduced benzene levels as described above. Detections from these locations indicated that Tank 57 may be the primary benzene source in this area. One additional temporary sample location (T10A) was placed north of fenceline sample location 10 to evaluate potential sources that may have intermittently been causing benzene detections at this fenceline sample location. The benzene detected at temporary sample location T10A, which is closer to Tank 57, showed approximately two times the numbers observed at sampling location 10.

### **November 2018 Corrective Action**

In November 2018, Navajo evaluated the possibility of removing Tank 57 from service. Tank 57 is a holding tank that serves as an important flow regulator for feed from the upstream Naphtha Hydrotreating units prior to the feed entering the "BenFree," Unit (Unit 20), and there are no other tanks in line that could substitute for Tank 57. Unit 20 produces high-octane components and reduces the benzene content of light naphtha feed for the commercial gasoline pool. Removing Tank 57 from service would require running feed directly from the upstream NHT units to Unit 20 and would create operational challenges for the refinery because of the need to operate Unit 20 at a controlled rate, while the flow rate of units upstream that would feed directly into the ISOM unit fluctuate. Notwithstanding this, on November 20, 2018, following steps to enable operation without Tank 57, (including steps that would allow certain components to act as flow buffers), Navajo temporarily removed Tank 57 from service (leaving approximately 15 feet of product in the tank, short of landing the roof) to evaluate whether detected benzene levels would fall below  $9 \mu\text{g}/\text{m}^3$ . Since November 2018, and for the remainder of the 2018 compliance period, the 14-day fenceline benzene concentrations related to Tank 57 were below this level. Additionally, on November 26, 2018, Navajo inspected Tank 57 with a FLIR camera. After removing the tank from service, only minor vapors from one spot on the roof deck were observed.

### **Results of Corrective Actions and Current Status of Benzene Fenceline Monitoring**

Navajo has implemented several root cause analyses and corrective actions as detailed in this document. Based on these root cause analyses, it is believed that Tank 57 was the primary source contributing to an annual average benzene concentration above the action level of  $9 \mu\text{g}/\text{m}^3$ . Following corrective actions, Navajo's 14-day benzene concentration,  $\Delta c$  values, have been below  $9 \mu\text{g}/\text{m}^3$  with the one exception previously described. In addition to the corrective actions presented above, Navajo reviewed its Tank 57 inspection records for the period between 2017 and 2019. Inspections for Tank 57 were performed in compliance with MACT CC Group 1 external floating roof requirements. Inspection records show that Tank 57's primary seal was inspected on January 4, 2017, and received a passing inspection. The next scheduled inspection for the primary seal is scheduled for January 4, 2022. The secondary seal on Tank 57 was also inspected on January 4, 2017, and received a passing inspection. During this inspection, however, the vacuum breaker seal was observed to be damaged. Navajo replaced the vacuum breaker seal as well as the gasketed float. As follow-up to the January 4, 2017 inspection, Tank 57's secondary seal was inspected again on January 18, 2018 and January 30, 2019, and received passing inspections.

### **Long-Term Corrective Action Plan**

Navajo is planning to implement a long-term project (the ISOM Project) that will result in the permanent removal of Tank 57 from its current service. The ISOM Project entails changes that will improve operation of Unit 20 and further increase the octane content of the light naphtha feed and make operation of Tank 57 as a holding tank and flow regulator unnecessary. Tank 57 will no longer be needed for this service because the

upgraded Unit 20 will be able to accommodate the variable feed rates from the upstream Naphtha Hydrotreating units without this tank. Capital expenditures for this project have been approved, and construction is currently anticipated to begin later in 2019 and to be complete in second or third quarter 2020, with startup shortly thereafter. Navajo plans to limit the use of Tank 57 until the ISOM Project is implemented, at which time Tank 57 may be removed from its current service.<sup>3</sup> Pursuant to 40 CFR 63.658(h), Navajo is submitting this letter to the Agency as a long-term corrective action plan, because implementation of the ISOM project will require more than 45 days to implement.

If you have questions regarding this corrective action plan, please contact me at [Scott.Denton@HollyFrontier.com](mailto:Scott.Denton@HollyFrontier.com) or by phone at 575-746-5487.

Sincerely,



Scott M. Denton  
Environmental Manager

Enclosure: Figure 1: Map of Navajo Artesia Fenceline Monitoring Locations

Cc: Chief  
Air, Toxics, and Inspections Coordination Branch  
Environmental Protection Agency, Region 6  
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<sup>3</sup> As previously noted, Tank 57 was temporarily taken out of service on November 20, 2018. It was necessary to put the tank back into service as a holding tank in early April 2019 in connection with replacement of the catalyst in the lead reactor in the BenFree Unit. The catalyst was nearing the end of its useful life and replacement was undertaken in order to lower the benzene content of the light naphtha feed entering the commercial gasoline pool. The catalyst replacement was completed in late April, and Tank 57 levels are being drawn down so that it can again be taken out of service. This is expected to be completed as soon as practical, by end of June or earlier.





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**EXPLANATION**

- ▲ GPS LOCATION
- SITE BOUNDARY (320.72 ACRES)



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**FIGURE 1**

**FENCELINE MONITORING SAMPLING STATIONS**

**HOLLYFRONTIER NAVAJO REFINING LLC  
ARTESIA, NEW MEXICO**